

SIPROTEC

Transformer differential protection 7UT613, 7UT63

Communication module

Modbus
Bus mapping

Preface

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Revision 1.0

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Preface

Purpose of this manual

The manual describes the register map organization of the Modbus slave of the SIPROTEC devices 7UT613, 7UT63 and is divided into the following topics:

- Modbus register map → Chapter 1.

General details about the function, operation, assembly and commissioning of the SIPROTEC devices you find in the

- SIPROTEC4 System Manual, order no. E50417–H1176–C151.

Modbus communication profile documentation

The following additional manual informs you about the data types, bus specific parameters and hardware interface of the Modbus slave module of the SIPROTEC devices:

Manual	Order number
SIPROTEC Communication module, Modbus - Communication profile	C53000-L1840-C001-03

Modbus specification

The Modbus specification with a detailed explanation of the Modbus protocol is contained in:

- MODICON
Modbus Protocol
Reference Guide
PI-MBUS-300 Rev. J
June 1996, Modicon, Inc.

Validity	<p>This manual is valid for the SIPROTEC devices:</p> <ul style="list-style-type: none">• 7UT613, 7UT63 (firmware version 4.0 or higher), <p>with</p> <ul style="list-style-type: none">• Modbus communication module version 03.00.04 or higher,• Modbus communication module version 03.01.01 or higher at use of• Transformer tap change commands/Transformer tap position indications (ref. to chap. 1.5.4). <p>For device parameterization have to be used:</p> <ul style="list-style-type: none">• DIGSI 4.4 or higher,• Modbus standard mappings 3-n (n = device type dependent number of standard mappings).
Additional Support	<p>For questions regarding SIPROTEC4 devices, please contact your Siemens representative.</p>
Training courses	<p>Individual course offerings may be found in our Training Catalog and questions can be directed to our Training Centre. Please contact your Siemens representative.</p>
Target audience	<p>Protection engineers, commissioning engineers, personnel concerned with adjustment, checking and service of selective protective equipment, automatic and control facilities and personnel of electrical facilities and power plants.</p>



Warning!

During operation of electrical equipment, certain parts of these devices are under high voltage. Severe personal injury or significant equipment damage could result from improper behaviour.

Only qualified personnel should work on this equipment or in the vicinity of this equipment. These personnel must be familiar with all warnings and service procedures described in this manual, as well as with safety regulations.

Prerequisites to proper and safe operation of this product are proper transport, proper storage, setup, installation, operation, and maintenance of the product, as well as careful operation and servicing of the device within the scope of the warnings and instructions of this manual.

In particular, the general facility and safety regulations for work with high-voltage equipment (e.g. ANSI, IEC, EN, or other national or international regulations) must be observed. Noncompliance may result in death, injury or significant equipment damage.

QUALIFIED PERSONNEL

Within the meaning of safety precautions of this manual and the instructions, qualified personnel are those persons who are qualified to set up, install, place into service, and operate this device, and who possess the following qualifications:

- Training and instruction (or other qualification) for switching, grounding, and designating devices and systems.
- Training or instruction in accordance with safety standards for care and use of certain safety equipment.

First aid training.

Typographic and graphical conventions

The following text formats are used to identify concepts giving device information described by the text flow:

Parameter names, or identifiers for configuration or function parameters that appear in the device display or on the screen of a PC (with DIGSI) are shown in mono-script (same point size) bold text. This also applies to header bars for selection menus.

Parameter conditions, or possible settings of parameters that appear in the device display or on the screen of a PC (with DIGSI), are additionally shown in italic style. This also applies to selection items for selection menus.

„Annunciations“, or identifiers for information produced by the device or required by other devices or from the switchgear is shown in mono-script (same point size) and placed into quotation marks.

For diagrams in which the identifier type results from the representation itself, text conventions may differ from the above-mentioned.

Revision index

Listing of the changes between the editions of this manual:

Modified chapters / pages	Edition	Reasons of modification
	1.0	First edition, Doc.-No.: C53000-L1840-C015-03 June 24 th , 2003

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Modbus register map

This chapter describes the register map organization of the Modbus slave of the SIPROTEC devices 7UT613, 7UT63.

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1.1 Explanations



Note:

The examples shown in this chapter 1.1 do not necessarily correspond to the real allocation of the objects in the register mapping.

Chapters 1.2 to 1.5 define the mapping of the data objects of the SIPROTEC devices 7UT613, 7UT63 to the associated Modbus registers.

The columns "Designation of the SIPROTEC objects" contain the texts of the SIPROTEC objects for "US English" device language.

The listed SIPROTEC data objects are *sorted by register numbers* (starting with 1), e.g.:

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to...)	Internal object no.
30001	IA S1 =	Operat. meas. current A side 1	32767 A	721

The measured value "IA S1" is assigned to register 30001 (Input register).

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10028	50/51 Ph A PU	1 = 50/51 Phase A picked up	1762

The single-point indication "50/51 Ph A PU" is assigned to the Input Status register 10028.



Note:

- The description of the standard mappings contains the pre-allocation of the mapping files *at delivery or at first assignment* of a mapping in DIGSI to the SIPROTEC device.
 - Changes of the allocation and the scaling of the measured values are possible in adaptation to the concrete installation environment. You find information about this in the manual "SIPROTEC Communication module, Modbus - Communication profile" (ref. to page i).
 - The definition of the data types (single-point indication, measured value etc.) are contained in the manual "SIPROTEC Communication module, Modbus - Communication profile" (ref. to page i).
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1.2 Coil Status registers (0X references)

The Coil Status register block allows the Modbus master:

- command outputs through the output relays of the SIPROTEC device (external commands),
- manipulation of taggings (internal commands),
- reading the checkback indication and/or the status of output relays as well as taggings.



Note:

- The allocation of the output relays to the switching devices and to the output channels is defined during parameterization of the SIPROTEC devices.
- Depending on the device composition there may be less than indicated output relays (and corresponding Modbus registers) available in the SIPROTEC device.

1.2.1 Registers 00001 to 00008: Double commands (with checkback indication)

- User-defined double commands with double-point indication as checkback indication can be routed on these position as “Source/Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00001	<user-defined> ON	not pro-allocated	-
00002	<user-defined> OFF		
00003	<user-defined> ON	not pro-allocated	-
00004	<user-defined> OFF		
00005	<user-defined> ON	not pro-allocated	-
00006	<user-defined> OFF		
00007	<user-defined> ON	not pro-allocated	-
00008	<user-defined> OFF		

1.2.2 Registers 00009 to 00016: Single commands (with checkback indication)

- User-defined single commands with checkback indication or taggings can be routed on these position as “Source/Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00009	<user-defined>	not pre-allocated	-
00010	<user-defined>	not pre-allocated	-
00011	<user-defined>	not pre-allocated	-
00012	<user-defined>	not pre-allocated	-
00013 - 00016	reserved	= 0	-

1.2.3 Registers 00017 to 00022: Internal commands

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00017	Command: Setting Group A	0 = not permitted 1 = Activation of setting group A	-
	Indication: Setting Group A	0 = Setting group A is not active 1 = Setting group A is active	
00018	Command: Setting Group B	0 = not permitted 1 = Activation of setting group B	-
	Indication: Setting Group B	0 = Setting group B is not active 1 = Setting group B is active	
00019	Command: Setting Group C	0 = not permitted 1 = Activation of setting group C	-
	Indication: Setting Group C	0 = Setting group C is not active 1 = Setting group C is active	
00020	Command: Setting Group D	0 = not permitted 1 = Activation of setting group D	-
	Indication: Setting Group D	0 = Setting group D is not active 1 = Setting group D is active	
00021	Command: ProtActive	0 = Deactivation of protection functions 1 = Activation of potection functions	52
	Indication: ProtActive	0 = No protection function is active. 1 = At least one protection function is active.	
00022	Command: ModeREMOTE	Control mode REMOTE 0 = Set to LOCKED 1 = Set to UNLOCKED	-
	Indication: ModeREMOTE	Control mode REMOTE 0 = LOCKED 1 = UNLOCKED	



Changing the setting group:

- In order to change the setting group, the value "1" = ON must be transmitted to the corresponding register.
- Switching ON one setting group automatically switches OFF the current active setting group.
- Transmission of the value "0" = OFF is insignificant for the change of the setting group and is refused by the device.

Note:

A change of the setting group is only possible via Modbus if the parameter **Change to Another Setting Group** (parameter address = 302) has the value **Protocol**.



Control mode REMOTE:

Control mode with control authority is REMOTE, option of unlocked control with Modbus.

- Changing the "Control mode REMOTE" to UNLOCKED permits one unlocked control operation via Modbus.
After execution of the command, the "Control mode REMOTE" in the SIPROTEC device will automatically be reset to LOCKED.
 - A programmed test "Switch in position" for unlocked control operations will always be executed.
 - If, after changing the "Control mode REMOTE" to UNLOCKED, no command is received via Modbus for a period of 5 minutes, then the "Control mode REMOTE" is automatically reset to LOCKED.
 - If the "Control mode REMOTE" was automatically reset to LOCKED by the SIPROTEC device then this status can be recognized by the corresponding bit in the Modbus input message.
In this case the status of "Control mode REMOTE" in output direction has to be updated by the Modbus master.
-

1.2.4 Registers Registers 00257 to 00264: Exception Flags

- Registers are write-protected.¹
- The contents of these registers is also readable using function "Read Exception Status" (function code 7).
- Installation-specific SIPROTEC objects can be routed on these register positions using parameterization system DIGSI.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
00257	<user-defined>	not pre-allocated	-
00258	<user-defined>	not pre-allocated	-
00259	<user-defined>	not pre-allocated	-
00260	<user-defined>	not pre-allocated	-
00261	<reserved>	= 0	-
00262	<reserved>	= 0	-
00263	<reserved>	= 0	-
00264	<reserved>	= 0	-

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.3 Input Status registers (1X references)

The Input Status register block allows the Modbus master to scan the current status of the input channels as well as the annunciations generated in the SIPROTEC device (e.g. protection annunciations, status annunciations).



Note:

- The allocation of the input channels to the binary inputs is defined during parameterization of the devices.
- Depending on the device composition and the existing protection packages not all of the indicated binary inputs or protection annunciations (and corresponding Modbus registers) may be available in the SIPROTEC device.

1.3.1 Registers 10001 to 10016: Single-point indications, taggings

- Further protection annunciations, single-point indications and taggings (internal single-point indications) can be routed on these register positions as "Destination system interface" using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10001	<user-defined>	not pre-allocated	-
10002	<user-defined>	not pre-allocated	-
10003	<user-defined>	not pre-allocated	-
10004	<user-defined>	not pre-allocated	-
10005	<user-defined>	not pre-allocated	-
10006	<user-defined>	not pre-allocated	-
10007	<user-defined>	not pre-allocated	-
10008	<user-defined>	not pre-allocated	-
10009	<user-defined>	not pre-allocated	-
10010	<user-defined>	not pre-allocated	-
10011	<user-defined>	not pre-allocated	-
10012	<user-defined>	not pre-allocated	-
10013	<user-defined>	not pre-allocated	-
10014	<user-defined>	not pre-allocated	-
10015	<user-defined>	not pre-allocated	-
10016	<user-defined>	not pre-allocated	-

1.3.2 Registers 10017 to 10023: Differential protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10017	87 picked up	1 = 87 Differential protection picked up	5631
10018	87 TRIP	1 = 87 TRIP	5671
10019	87 TRIP Phase A	1 = 87 TRIP Phase A	5672
10020	87 TRIP Phase B	1 = 87 TRIP Phase B	5673
10021	87 TRIP Phase C	1 = 87 TRIP Phase C	5674
10022	87-1 TRIP	1 = 87-1 TRIP	5691
10023	87-2 TRIP	1 = 87-2 TRIP	5692

1.3.3 Registers 10024 to 10025: Restricted ground fault protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10024	87G Picked Up	1 = 87G Picked up	5817
10025	87G TRIP	1 = 87G TRIP	5821

1.3.4 Registers 10026 to 10027: Time overcurrent protection (general)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10026	50(N,G) PU	1 = 50(N,G)/51(N,G) O/C PICKUP	1761
10027	50/51(N,G) TRIP	1 = 50(N,G)/51(N,G) TRIP	1791

1.3.5 Registers 10028 to 10038: Time overcurrent protection (50/51)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10028	50/51 Ph A PU	1 = 50/51 Phase A picked up	1762
10029	50/51 Ph B PU	1 = 50/51 Phase B picked up	1763
10030	50/51 Ph C PU	1 = 50/51 Phase C picked up	1764
10031	50-2 TRIP	1 = 50-2 TRIP	1805
10032	50-2 TRIP	1 = 50-2 TRIP	1815
10033	51 picked up	1 = 51 picked up	1820
10034	51 TRIP	1 = 51 TRIP	1825
10035	50/51 PhA InrPU	1 = 50/51 Phase A InRush picked up	7565
10036	50/51 PhB InrPU	1 = 50/51 Phase B InRush picked up	7566

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10037	50/51 PhC InrPU	1 = 50/51 Phase C InRush picked up	7567
10038	50/51 Dset.ACT	1 = Dynamic settings 50/51 are ACTIVE	1998

1.3.6 Registers 10039 to 10045: Time overcurrent protection (50N/51N)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10039	50N/51N pick.up	1 = 50N/51N picked up	1766
10040	50N-2 TRIP	1 = 50N-2 TRIP	1903
10041	50N-1 TRIP	1 = 50N-1 TRIP	1906
10042	51N picked up	1 = 51N picked up	1907
10043	51N TRIP	1 = 51N TRIP	1909
10044	50/51N InRushPU	1 = 50/51N InRush picked up	7568
10045	50/51N Dset.ACT	1 = Dynamic settings 50N/51N are ACTIVE	1999

1.3.7 Registers 10046 to 10052: Time overcurrent protection (50G/51G)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10046	50G/51G pick.up	1 = 50G/51G picked up	1765
10047	50G-2 TRIP	1 = 50G-2 TRIP	1833
10048	50G-1 TRIP	1 = 50G-1 TRIP	1836
10049	51G picked up	1 = 51G picked up	1837
10050	51G TRIP	1 = 51G TRIP	1839
10051	Gnd InRush PU	1 = Ground InRush picked up	7564
10052	50/51G Dset.ACT	1 = Dynamic settings 50G/51G are ACTIVE	2000

1.3.8 Registers 10053 to 10059: Thermal overload protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10053	49 O/L I Alarm	1 = 49 Overload Current Alarm (I alarm)	1515
10054	49 O/L Θ Alarm	1 = 49 Thermal Overload Alarm	1516
10055	49 Th O/L TRIP	1 = 49 Thermal Overload TRIP	1521
10056	49 ht. spot Al.	1 = 49 Thermal Overload hot spot Th. Alarm	1541
10057	49 ht.spot TRIP	1 = 49 Thermal Overload hot spot Th. TRIP	1542
10058	49 al.rate Al.	1 = 49 Thermal Overload aging rate Alarm	1543
10059	49 ag.rt. TRIP	1 = 49 Thermal Overload aging rate TRIP	1544

1.3.9 Registers 10060 to 10063: Unbalanced load protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10060	46-2 picked up	1 = 46-2 picked up	5159
10061	46-1 picked up	1 = 46-1 picked up	5165
10062	46-TOC pickedup	1 = 46-TOC pickedup	5166
10063	46 TRIP	1 = 46 TRIP	5170

1.3.10 Registers 10064 to 10066: Circuit breaker failure protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10064	50BF int Pickup	1 = 50BF (internal) PICKUP	1456
10065	50BF ext Pickup	1 = 50BF (external) PICKUP	1457
10066	50BF-1 locTRIP	1 = 50BF-1 TRIP (local trip)	1492
10067	50BF-2 busTRIP	1 = 50BF-2 TRIP (busbar trip)	1494

1.3.11 Registers 10068 to 10070: Time overcurrent protection (50 1Ph)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10068	50 1Ph Pickup	1 = 50 1Ph Picked up	5971
10069	50 1Ph-1 TRIP	1 = 50 1Ph-1 TRIP	5975
10070	50 1Ph-2 TRIP	1 = 50 1Ph-2 TRIP	5979

1.3.12 Registers 10071 to 10075: Overexcitation protection

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10071	24 warn	1 = 24 V/f warning stage	5367
10072	24-1 picked up	1 = 24-1 V/f> picked up	5370
10073	24-2 picked up	1 = 24-2 V/f>> picked up	5373
10074	24-2 TRIP	1 = 24-2 TRIP of V/f>> stage	5371
10075	24 th.TRIP	1 = 24 TRIP of th. stage	5372

1.3.13 Registers 10076 to 10088: Thermobox (7XV566)

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10076	Fail: RTD	1 = Fail: RTD (broken wire/shorted)	14101
10077	RTD 1 St.1 p.up	1 = RTD 1 Temperature stage 1 picked up	14112
10078	RTD 1 St.2 p.up	1 = RTD 1 Temperature stage 2 picked up	14113
10079	RTD 2 St.1 p.up	1 = RTD 2 Temperature stage 1 picked up	14122
10080	RTD 2 St.2 p.up	1 = RTD 2 Temperature stage 2 picked up	14123
10081	RTD 3 St.1 p.up	1 = RTD 3 Temperature stage 1 picked up	14132
10082	RTD 3 St.2 p.up	1 = RTD 3 Temperature stage 2 picked up	14133
10083	RTD 4 St.1 p.up	1 = RTD 4 Temperature stage 1 picked up	14142
10084	RTD 4 St.2 p.up	1 = RTD 4 Temperature stage 2 picked up	14143
10085	RTD 5 St.1 p.up	1 = RTD 5 Temperature stage 1 picked up	14152
10086	RTD 5 St.2 p.up	1 = RTD 5 Temperature stage 2 picked up	14153
10087	RTD 6 St.1 p.up	1 = RTD 6 Temperature stage 1 picked up	14162
10088	RTD 6 St.2 p.up	1 = RTD 6 Temperature stage 2 picked up	14163

1.3.14 Registers 10089 to 10090: External trip commands

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10089	Ext 1 Gen. TRIP	1 = External trip 1: General TRIP	4537
10090	Ext 2 Gen. TRIP	1 = External trip 2: General TRIP	4557

1.3.15 Register 10091: Trip coil monitor

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10091	FAIL: Trip cir.	1 = 74TC Failure Trip Circuit	6865

1.3.16 Registers 10092 to 10095: Control authority, Control mode LOCAL

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
10092	Cntrl Auth (device 7UT613) ¹	Control authority (0 = REMOTE, 1 = LOCAL)	-
10093	ModeLOCAL (device 7UT613) ¹	Control mode LOCAL (0 = LOCKED, 1 = UNLOCKED)	-
10094	Cntrl Auth (device 7UT63) ²	Control authority (0 = REMOTE, 1 = LOCAL)	-
10095	ModeLOCAL (device 7UT63) ²	Control mode LOCAL (0 = LOCKED, 1 = UNLOCKED)	-

1 Not used in the 7UT63.

2 Not used in the 7UT613.

1.4 Input registers (3X references)

The Input register block allows the Modbus master to read the values of the the analog inputs of the SIPROTEC device (recorded measured values).



Note:

Depending on the device composition not all of the indicated analog inputs (and corresponding Modbus registers) may be available in the SIPROTEC device.

The given default scaling values for the measured values in the standard mapping apply to installations with the following nominal operating values:

Rated Apparent Power of the Transformer (parameter address 0249):

→ 10.01 ... 100.00 MVA

Rated Primary Voltage Side 1 (parameter address 0240):

→ 100.01 ... 1000.00 kV



Note:

- Changes of the scaling of the measured values are possible in adaption to the concrete installation environment.
You find information about this in the manual "SIPROTEC Communication module, Modbus - Communication profile" (ref. to page i).
- If other measured values than routed per default shall be transmitted via Modbus, then the positions of the not required measured values have to be released in the **DIGSI Configuration matrix** first (remove the cross in the associated column "Destination system interface").
For this the protection function of the SIPROTEC device in which the measured values currently routed are available must if necessary be activated.

Example:

The device 7UT613, 7UT63 shall be used as 1 phase busbar protection.

To release the positions of the measured values routed per default for transformer protection select Protection Object = 3 phase Transformer first and remove the measured values from "Destination system interface".

After this the positions are available for new routing with device configuration Protection Object = 1 phase Busbar.

1.4.1 Registers 30001 to 30019: Operational values

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30001	IA S1 =	Operat. meas. current A side 1	32767 A	721
30002	IB S1 =	Operat. meas. current B side 1	32767 A	722
30003	IC S1 =	Operat. meas. current C side 1	32767 A	723
30004	IA S2 =	Operat. meas. current A side 2	327.67 kA	724
30005	IB S2 =	Operat. meas. current B side 2	327.67 kA	725
30006	IC S2 =	Operat. meas. current C side 2	327.67 kA	726
30007	IA S3=	Operat. meas. current A side 3	32767 A	727
30008	IB S3=	Operat. meas. current B side 3	32767 A	728
30009	IC S3=	Operat. meas. current C side 3	32767 A	729
30010	Freq =	Frequency	327.67 Hz	644
30011	3I0S1=	3I0 (zero sequence) of side 1	32767 A	30640
30012	I1S1 =	I1 (positive sequence) of side 1	32767 A	30641
30013	I2S1 =	I2 (negative sequence) of side 1	32767 A	30642
30014	3I0S2 =	3I0 (zero sequence) of side 2	327.67 kA	30643
30015	I1S2 =	I1 (positive sequence) of side 2	327.67 kA	30644
30016	I2S2 =	I2 (negative sequence) of side 2	327.67 kA	30645
30017	3I0S3 =	3I0 (zero sequence) of side 3	327.67 kA	30713
30018	I1S3 =	I1 (positive sequence) of side 3	327.67 kA	30714
30019	I2S3 =	I2 (negative sequence) of side 3	327.67 kA	30715

1.4.2 Registers 30020 to 30029: Thermal measurement

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30020	Θ / Θ trip =	Temperat. rise for warning and trip	327.67 %	801
30021	Θ leg A =	Hot spot temperature of leg A	3276.7 °C/°F ¹	30691
30022	Θ leg B =	Hot spot temperature of leg B	3276.7 °C/°F ¹	30692

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30023	Θ leg C =	Hot spot temperature of leg C	3276.7 °C/°F ¹	30693
30024	Θ leg a-b =	Hot spot temperature of leg phase a-b	3276.7 °C/°F ¹	30694
30025	Θ leg b-c =	Hot spot temperature of leg phase b-c	3276.7 °C/°F ¹	30695
30026	Θ leg c-a =	Hot spot temperature of leg phase c-a	3276.7 °C/°F ¹	30696
30027	Ag.Rate =	Aging Rate	327.67 (dimensionless)	1063
30028	Res-1 =	Load Reserve to Stage-1 level	327.67 %	1066
30029	Res-2 =	Load Reserve to Stage-2 level	327.67 %	1067

1 ref. to parameter **Temperature unit** (parameter address = 0276)

1.4.3 Registers 30030 to 30035: Thermobox (7XV556)

Register	Designation of the SIPROTEC objects	Comments	Scaling (32767 corresponds to ...)	Internal object no.
30030	Θ RTD 1 =	Temperature of RTD 1	3276.7 °C/°F ¹	1068
30031	Θ RTD 2 =	Temperature of RTD2	3276.7 °C/°F ¹	1069
30032	Θ RTD 3 =	Temperature of RTD 3	3276.7 °C/°F ¹	1070
30033	Θ RTD 4 =	Temperature of RTD 4	3276.7 °C/°F ¹	1071
30034	Θ RTD 5 =	Temperature of RTD 5	3276.7 °C/°F ¹	1072
30035	Θ RTD 6 =	Temperature of RTD 6	3276.7 °C/°F ¹	1073

1 ref. to parameter **Temperature unit** (parameter address = 0276)

1.5 Holding registers (4X references)

The Holding register block allows the Modbus master:

- query of system and diagnostic information, transformer tap position indications, statistic values as well as metered measurands / counters,
- execution of transformer tap change commands,
- time synchronization of the SIPROTEC device and
- reading the Event recorder (Sequence of Events).



Note:

Depending on the device composition not all of the indicated metered measurands or statistic values (and corresponding Modbus registers) may be available in the SIPROTEC device.

1.5.1 Registers 40001 to 40036: System information

- Registers are write-protected.¹

Register	Designation of the SIPROTEC objects	Comments
40001 - 40008	Hardware designation of the communication module (string, max. 16 characters)	"AME-GEN" for AME module, "AMO-GEN" for AMO module
40009 - 40010	Communication module software revision	<u>Example:</u> Register 40009 = 0001H, register 40010 = 0205H → Revision 1.2.5
40011 - 40026	MLFB (order number) of the SIPROTEC device (string, max. 32 characters)	<u>Example:</u> "7UT61315EC921BA0----0D-----"
40027 - 40034	Date and time of mapping data generation (string, max. 16 characters)	<u>Example:</u> "170203095747330" corresponds to → Date: Feb. 17th, 2003 → Time: 09 hours, 57 min., 47 sec. and 330 milliseconds
40035 - 40036	Number of selected standard mapping, Revision of mapping data	MSB of register 40035: → Number of selected standard mapping LSB of register 40035 and value of register 40036: → Revision of mapping data <u>Example:</u> Register 40035 = 3102H, register 40036 = 0304H → Standard mapping 3-1, Revision 2.3.4

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.5.2 Registers 40065 to 40069: Time synchronization

- Ref. to chap. "Time synchronization" in the manual "SIPROTEC Communication module, Modbus - Communication profile" for additional notes regarding methods of time synchronization and Time/Date data type.

Register	Designation of the SIPROTEC objects	Comments
40065	Milliseconds	Time/Date transfer registers
40066	Hours / Minutes	
40067	Month / Day	
40068	Time/Date status byte / Year	
40069	"Set Time and Date"	available only, if time synchronization is configured with use of the "Set Time and Date" register

1.5.3 Register 40129: Diagnosis

- Registers are write-protected.¹
- The contents of this register is also readable using function "Diagnostics" (function code 7), subfunction "Return Diagnostic Register" (subfunction code 2).
- Ref. to chap. "Bus specific parameters" in the manual "SIPROTEC Communication module, Modbus - Communication profile" regarding signalization of "Data invalid" (register 40129/2¹⁵).

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
40129/2 ⁰	Device OK	1 = Update of the device replica in the SIPROTEC device completed after initial start or restart	51
40129/2 ¹	<user-defined>	not pre-allocated	-
40129/2 ²	Settings Calc.	1 = Setting calculation is running	70
40129/2 ³	Error Sum Alarm	1 = Error with a summary alarm ON	140
40129/2 ⁴	Alarm Sum Event	1 = Alarm summary event ON	160
40129/2 ⁵	Relay PICKUP	1 = Relay PICKUP (group signal)	501
40129/2 ⁶	Relay TRIP	1 = Relay GENERAL TRIP command	511
40129/2 ⁷	DataStop	1 = Stop data transmission is active	-
40129/2 ⁸	Test mode	1 = Test mode is active	-
40129/2 ⁹	<user-defined>	not pre-allocated	-
40129/2 ¹⁰	<user-defined>	not pre-allocated	-
40129/2 ¹¹	<user-defined>	not pre-allocated	-
40129/2 ¹²	<user-defined>	not pre-allocated	-
40129/2 ¹³	<user-defined>	not pre-allocated	-
40129/2 ¹⁴	<user-defined>	not pre-allocated	-
40129/2 ¹⁵	Data invalid	1 = Data in the Modbus message are invalid. (This indication is created by the Modbus slave; not available in DIGSI and not relocatable.)	-



Stop data transmission:

The functionality "Stop data transmission" is not supported via Modbus communication.

If "Stop data transmission" is active nevertheless data via Modbus will be transmitted furthermore.

The annunciation "DataStop" signals the activation of "Stop data transmission" however and can be evaluated correspondingly in the Modbus master.

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.5.4 Registers 40151 to 40152: Transformer tap change commands and Transformer tap position indications

- User-defined transformer tap change commands and transformer tap position indications can be routed on these position as "Source/Destination system interface" using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
40151	Command (write access): Transformer tap change command #1	not pre-allocated	-
	Indication (read access): Transformer tap position indication #1	not pre-allocated	
40152	Command (write access): Transformer tap change command #2	not pre-allocated	-
	Indication (read access): Transformer tap position indication #2	not pre-allocated	

1.5.5 Registers 40201 to 40208: Metered measurands

- Registers are write-protected.¹
- Installation-specific metered measurands / counters can be routed on these register positions as “Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Scaling ($2^{31}-1$ corresponds to ...)	Internal object no.
40201 - 40202	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-
40203 - 40204	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-
40205 - 40206	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-
40207 - 40208	<user-defined>	not pre-allocated	$2^{31}-1$ impulses	-

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.5.6 Registers 40301 to 40316: Statistic values

- Registers are write-protected.¹
- Installation-specific statistic values can be routed on these register positions as “Destination system interface” using the **DIGSI Configuration matrix**.

Register	Designation of the SIPROTEC objects	Comments	Internal object no.
40301 - 40302	<user-defined>	not pre-allocated	-
40303 - 40304	<user-defined>	not pre-allocated	-
40305 - 40306	<user-defined>	not pre-allocated	-
40307 - 40308	<user-defined>	not pre-allocated	-
40309 - 40310	<user-defined>	not pre-allocated	-
40311 - 40312	<user-defined>	not pre-allocated	-
40313 - 40314	<user-defined>	not pre-allocated	-
40315 - 40316	<user-defined>	not pre-allocated	-

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

1.5.7 Registers 40601 to 40626: Event recorder (Sequence of Events)

- Registers are write-protected (with the exception of “SOE_Control”).¹
- Information regarding the individual information in the handshake register, the data type “Message block” and the evaluation of Event recorder entries you find in the manual “SIPROTEC Communication module, Modbus - Communication profile” (ref. to page i).
- Only the annunciation “Data invalid” (ref. to chap. 1.5.3) is routed per default to the Event recorder.
Further annunciations can be added to the Event recorder using DIGSI (ref. to chap. “Customization of the allocations” in the manual “SIPROTEC Communication module, Modbus - Communication profile”).

Register	Designation	Comments
40601	No. of Event recorder entries	Number of Event recorder entries which still were not read
40602	“SOE_Control”	Handshake register (read/write access)
40603	Message block #1	Register type / Bit offset #1
40604		Register address #1
40605		Message cause / Indication type #1
40606		Value #1
40607 - 40610		Time stamp #1
40611		Message block #2
40612	Register address #2	
40613	Message cause / Indication type #2	
40614	Value #2	
40615 - 40618	Time stamp #2	
40619	Message block #3	
40620		Register address #3
40621		Message cause / Indication type #3
40622		Value #3
40623 - 40626		Time stamp #3

1. A write access is rejected with exception code 03 (ILLEGAL_DATA_VALUE).

Glossary

AME	Universal asynchronous communication module with (electrical) isolated RS485 interface for the SIPROTEC devices from Siemens.
AMO	Universal asynchronous communication module with fibre-optical interface for the SIPROTEC devices from Siemens.
CFC	Continuous Function Chart
CRC	Cyclical Redundancy Check
DC	Double Command
DIGSI	Parameterization system / parameterization software for SIPROTEC devices
DP	Double-point indication
Input data / Input direction	Data from the Modbus slave to the Modbus master.
LRC	Longitudinal Redundancy Check
LSB	Least Significant Byte
Mapping	Allocation of the SIPROTEC data objects to the positions in the Modbus register map.
MSB	Most Significant Byte
Output data / Output direction	Data from the Modbus master to the Modbus slave.
SC	Single command
SP	Single-point indication
TC	Transformer tap change command
TM	Transformer tap position indication / Transformer tap message

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